Modbus Serial Communication Device Type Manager

User Manual

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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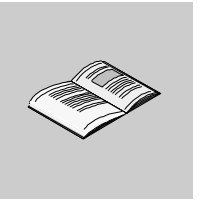
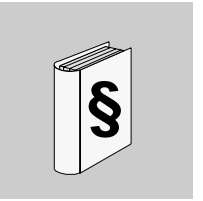
Table of Contents



	Safety Information	**5**
	About the Book	**7**
Chapter 1	**Hardware and Software Requirements**	**9**
	System Requirements	10
	Compatibility	12
	Considerations	13
	Installing and Removing the Modbus Comm DTM	14
Chapter 2	**Connection Types and Communication Models**	**15**
	Connection Types for Modbus SL Comm DTM	16
	Communication Models for Modbus SL Comm DTM	17
Chapter 3	**DTM Graphical User Interface**	**23**
	Graphical User Interface	23
Chapter 4	**Configuration**	**27**
	Configuration Tab for Modbus SL Comm DTM	28
	Serial Configuration for Modbus SL Comm DTM	30
	Bluetooth Configuration for Modbus SL Comm DTM	31
	Remote Gateway Configuration for Modbus SL Comm DTM	32
	Modem Connection Configuration for Modbus SL Comm DTM	33
	USB Connection Configuration for Modbus SL Comm DTM	34
	Runtime Tab	35
	Address Table	37
	Scan Configuration	39
Glossary		**41**
Index		**45**

Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

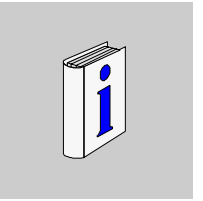
NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This user manual is intended to describe the use of the Communication Device Type Manager (Comm DTM) for Modbus.

Validity Note

This document has been updated with the release of Comm DTM V2.0.

Product Related Information

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.[1]
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

Hardware and Software Requirements

1

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
System Requirements	10
Compatibility	12
Considerations	13
Installing and Removing the Modbus Comm DTM	14

System Requirements

Hardware Requirements

Requirement	Minimum	Recommended
Computer	Pentium 4 or equivalent	Core 2 Duo
RAM	1 GB	2 GB
Free Hard Drive Space on System Drive	30 MB	
Free Hard Drive Space on Installation Drive	60 MB	
Swap File	1024 MB	2048 MB
Monitor Display	256 color SVGA 800 x 600 resolution	True color XGA 1024 x 768 resolution

Software Requirements

Software operating systems

Operating System	Edition/Service Pack	Special Considerations
Windows 2000	SP2 or later	You need administrator access rights to install the Modbus Serial Comm DTM.
Windows XP Professional	SP2 or later	
Windows Vista 32-Bit	SP2	
Windows Vista 64-Bit	SP2	
Windows 7 32-Bit	-	
Windows 7 64-Bit	-	
Windows 7 XP mode (Virtual PC)[1]	-	

[1] You must use the Windows 7 XP Virtual PC mode. SoMachine is not copatible with Windows 7 XP Application mode.

Software installed on the PC

Software	Edition	Special Considerations
Microsoft.NET Framework	V2.0	-
FDT Frame Application	FDT 1.2 or FDT 1.2.1	The Modbus SL Comm DTM requires an FDT Frame Application compliant to the FDT standard. The FDT Frame Application must support the Microsoft.NET Framework 2.0.
Schneider Modbus Serial PC Driver	Editions: ● V1.8 IE35 (Windows XP 32 Bit) ● V2.0 IE10 (Windows Vista 32 Bit) ● V1.10 IE37 (Windows XP 32 Bit) ● V2.2 IE12 (Windows Vista 32 Bit) ● V3.2 IE12 (Windows Vista 64 Bit) ● V2.2 IE12 (Windows 7 32 Bit) ● V3.2 IE12 (Windows 7 64 Bit)	The Modbus Serial Comm DTM requires the Schneider Modbus Serial PC Driver installed on the system.

Compatibility

FDT Compatibility

The Modbus Comm DTM is compliant to the FDT standards FDT 1.2 and FDT 1.2.1. It is based on the FDT Modbus Annex 1.0.

Modbus Compatibility

The Modbus Comm DTM supports Modbus services specified in the Modbus Application Protocol specification V1.1b

Considerations

Windows User Rights

The Modbus SL Comm DTM can be run under Windows Vista/Windows 7 with administrator access rights without any restrictions. If you want to run the Modbus SL Comm DTM under Windows Vista/Windows 7 with standard user rights the maximum number of concurrent Modbus connections is limited to 4 connections.

In addition the following steps must be performed after the installation process is finished:

- open the Windows **Control Panel**
- double-click the **Driver Manager** icon
- open the **Modbus Serial Driver** tab
- configure and start all 4 instance of the Modbus Serial PC Driver
- check if all instances are running (4 icons of the Modbus Serial Driver in the system tray)

NOTE: To perform these steps administrator access rights are required.

Installing and Removing the Modbus Comm DTM

Installation

To install the Modbus Comm DTM double-click on the file *setup.exe* and follow the instructions in the installation wizard.

Removal

To remove the Modbus Comm DTM from your computer, choose **Start** →**Settings** →**Control Panel** →**Add/Remove Programs**.

Connection Types and Communication Models

2

Introduction

This chapter gives an overview about the different configurations the Modbus Comm DTM can be used with to establish Modbus communications.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Connection Types for Modbus SL Comm DTM	16
Communication Models for Modbus SL Comm DTM	17

Connection Types for Modbus SL Comm DTM

Introduction

The Modbus SL Comm DTM can be used to establish Modbus communications based on different connection types.

Serial Connection

The Modbus SL Comm DTM provides the possibility to establish a Modbus communication via a standard PC serial port.

USB/RS232, USB/RS485 Converter Connection

The Modbus SL Comm DTM can be used to establish a Modbus communication via a USB/RS232 or USB/RS485 converters.

NOTE: The Modbus SL Comm DTM only supports USB converters which can be accessed as Virtual COM Ports.

USB Connection

The Modbus SL Comm DTM can be used to establish a Modbus communication by using the following cables:

- TCS XCN AMUM3P
- UNY XCA USB 033
- BMX XCA USB H018/045

Gateway Connection

The Modbus SL Comm DTM can be used to establish a Modbus communication to Modbus serial devices behind a Modbus TCP/Modbus Serial gateway. In this case the connection is established via the Ethernet network adapter of the PC.

Bluetooth Connection

The Modbus SL Comm DTM provides the possibility to establish a Modbus communication via Bluetooth.

NOTE: The Modbus SL Comm DTM only supports Bluetooth adapters which implement the Bluetooth Serial Port Profile (SPP).

Serial Modem Connection

The Modbus SL Comm DTM can be used in conjunction with standard serial line modems to establish Modbus communications to remote devices.

Communication Models for Modbus SL Comm DTM

Introduction

This chapter describes the different communication models supported by the Modbus SL Comm DTM.

NOTE: The FDT Technology is not designed for real-time data transfer. Depending on your system and communication model you employ, the data may not reflect the actual, real-time device state.

⚠ WARNING

INVALID DEVICE STATE INFORMATION

Do not use the Modbus Comm DTM for time critical controlling or monitoring tasks because the transferred data may not reflect the actual device state. The FDT Technology is not designed for this purpose.

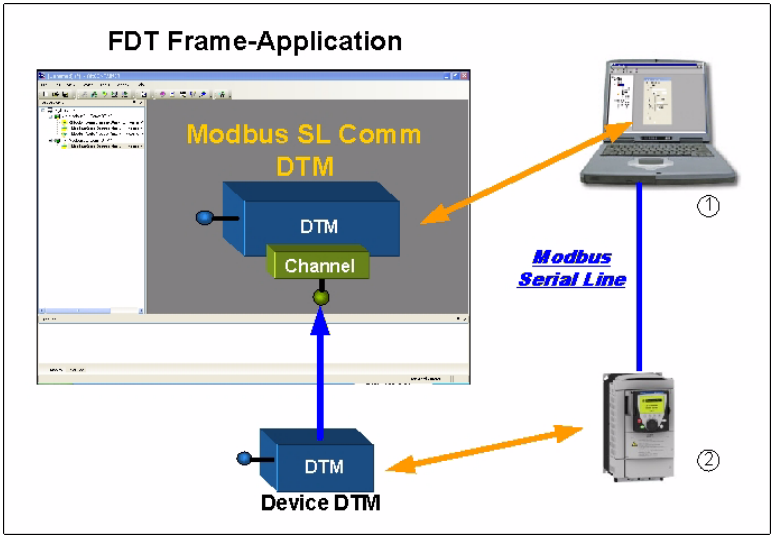
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Direct Connection

The Modbus SL Comm DTM can be used to establish a direct Modbus communication between the PC and the target device.

For the direct connection the following physical connection types are supported:

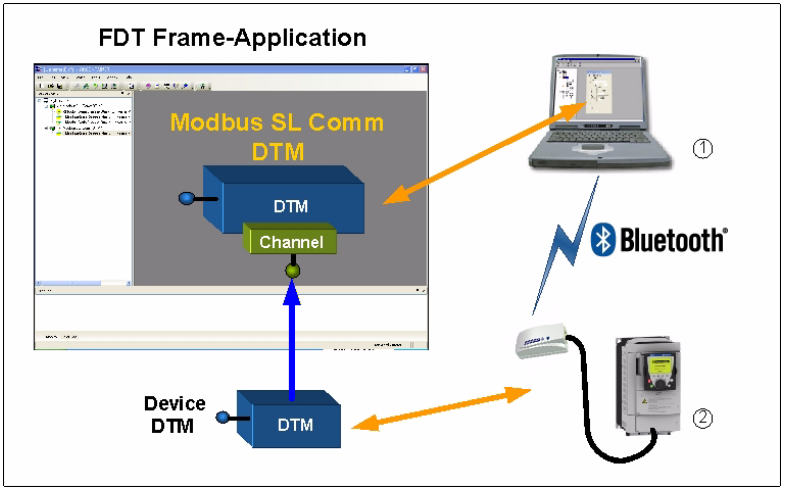
- RS232
- RS485 by using an RS232/RS485 converter
- USB by using an USB/Serial Line converter
- USB by using a direct USB cable (see your hardware manual for the correct cable reference)



1 PC with Modbus SL Comm DTM
2 target device

Bluetooth Connection

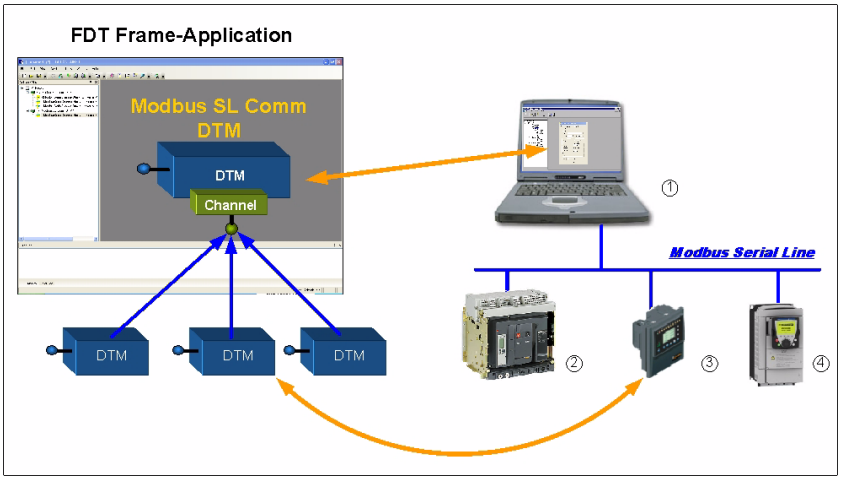
The Modbus SL Comm DTM can be used to establish a direct Modbus communication between the PC and the target device via Bluetooth.



1 PC with Modbus Serial Comm DTM
2 target device

Bus Connection

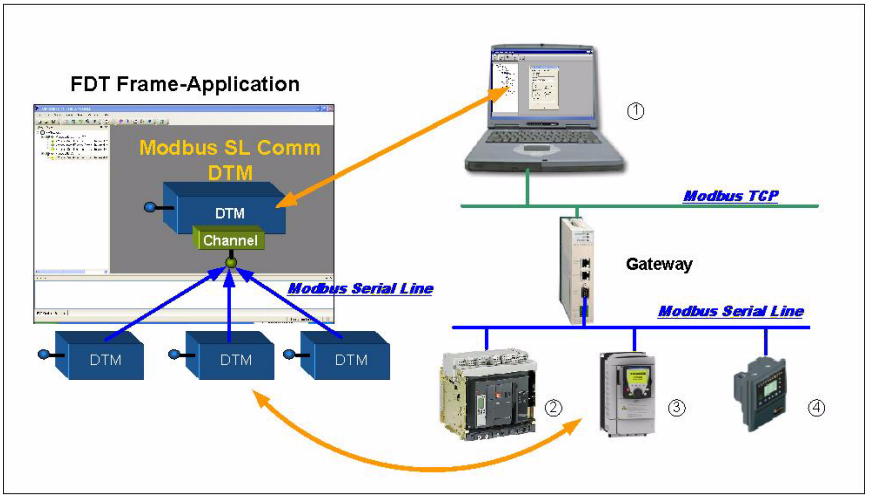
The Modbus SL Comm DTM can be used in conjunction with a RS232/RS485 converter to establish a Modbus communication to a Modbus Serial Line bus.



1 PC with Modbus SL Comm DTM
2-4 target devices

Gateway Connection

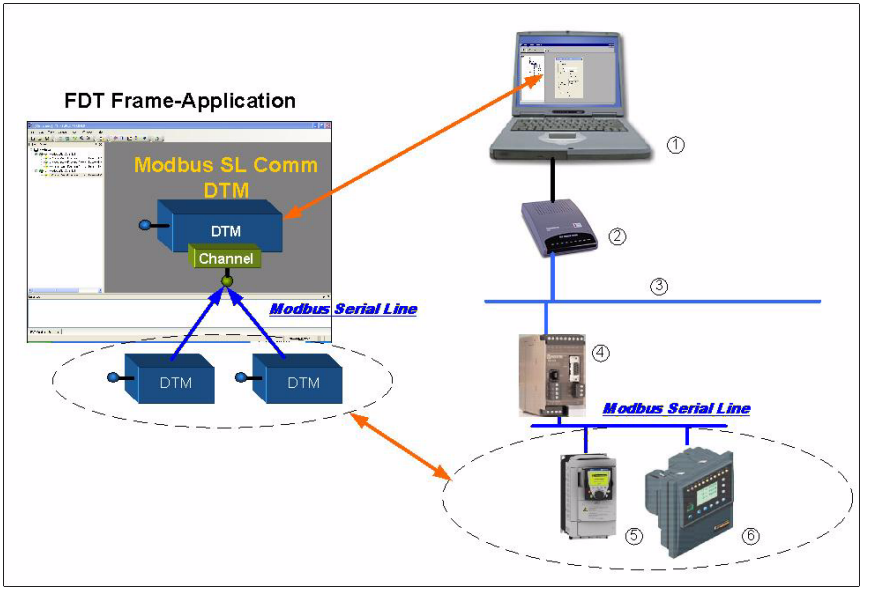
The Modbus SL Comm DTM can be used to establish a Modbus communication to Modbus serial devices behind a Modbus TCP/Modbus Serial gateway.



1 PC with Modbus SL Comm DTM
2-4 target devices

Modem Connection

The Modbus SL Comm DTM can be used in conjunction with a standard serial line modem to establish Modbus communications to remote devices.



1 PC with Modbus SL Comm DTM
2 standard serial modem
3 telephone line
4 industrial serial modem
5-6 target devices

DTM Graphical User Interface

3

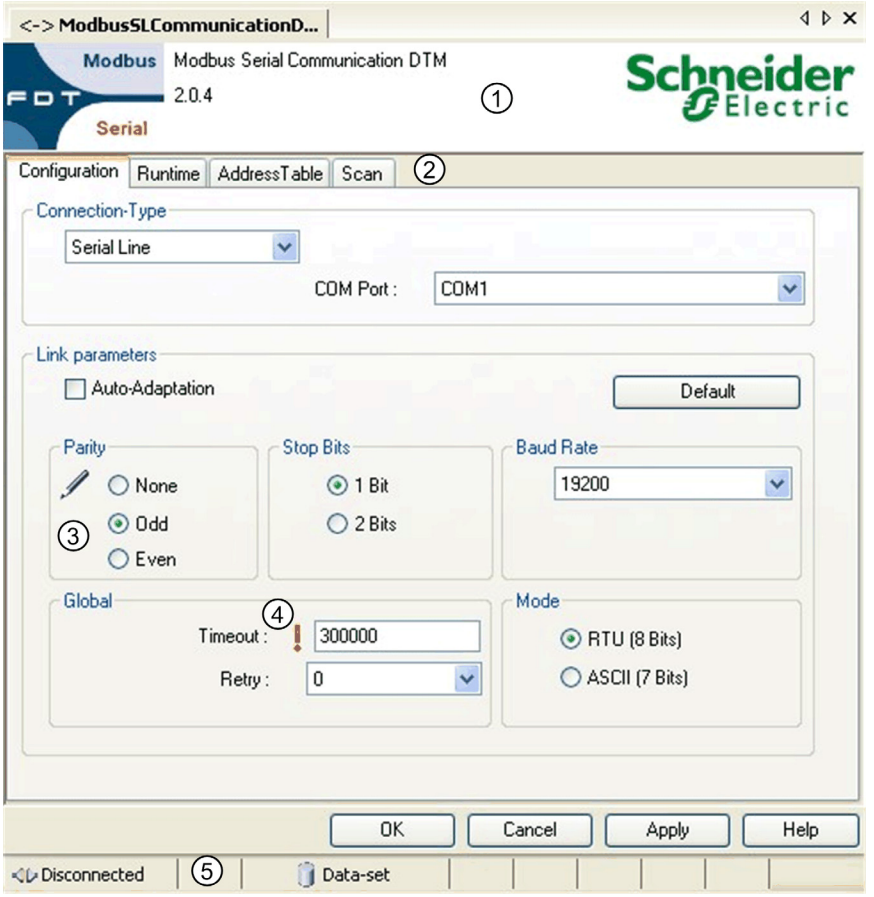
Graphical User Interface

Overview

This chapter describes the graphical user interface (GUI) of the Modbus SL Comm DTM.

Introduction

The following figure shows the GUI (graphical user interface) of the DTM.



1 Identification area
2 Tab menu
3-4 Parameter status icons
5 Status bar

Identification Area

The identification area shows the name and the version of the DTM.

Tab Menu

Use the tab menu to access the different functions provided by the DTM.

Parameter Status Icons

The parameter status icons provide information about the current state of the parameter.

Possible parameter states

Icon	Meaning
	The parameter was modified and has an invalid value.
	The parameter was modified and has a valid value

Status Bar

The status bar provides information about the current status of the DTM.

Possible connection states

Icon	Text	Meaning	DTM State
	Disconnected	disconnected	all other states
	Connecting	connecting	going online
	Connected	connected	online
	Disconnecting	disconnecting	going offline
	Interrupted	interrupted	detected communication interruption

Possible data source states

Icon	Text	Behavior
	Data set	Displayed values are loaded from the instance data set. Changed values are affected on the instance data set only.
	Data set locked	Displayed values are loaded from the instance data set. Data set is locked.

Configuration

4

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Configuration Tab for Modbus SL Comm DTM	28
Serial Configuration for Modbus SL Comm DTM	30
Bluetooth Configuration for Modbus SL Comm DTM	31
Remote Gateway Configuration for Modbus SL Comm DTM	32
Modem Connection Configuration for Modbus SL Comm DTM	33
USB Connection Configuration for Modbus SL Comm DTM	34
Runtime Tab	35
Address Table	37
Scan Configuration	39

Configuration Tab for Modbus SL Comm DTM

Introduction

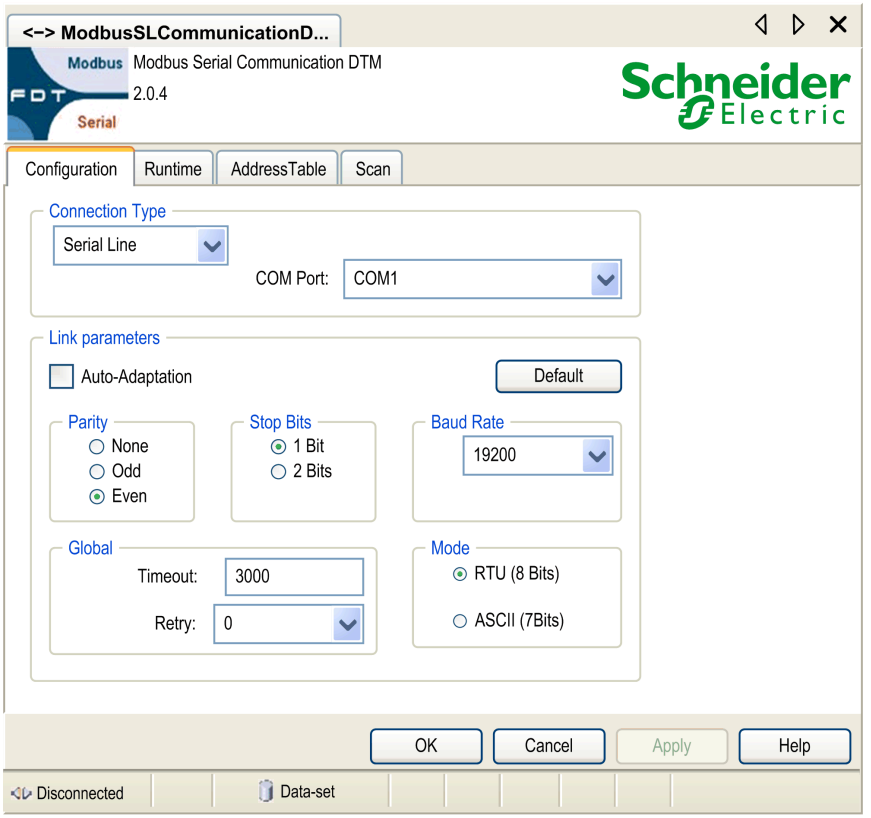
The **Configuration** tab of the Modbus SL Comm DTM contains the communication parameters for the different connection types.

Configuration Tab

You have several possibilities to access the **Configuration** tab of the Modbus Serial Comm DTM:

- In the network view of your FDT Frame Application, double-click the Modbus SL Comm DTM icon.
- In the network view of your FDT Frame Application, right-click the Modbus SL Comm DTM icon and then click **Configuration**.

The following figure shows the **Configuration** tab of the Modbus SL Comm DTM dialog:



Connection Type

In the combo box **Connection Type** on the **Configuration** tab of the Modbus SL Comm DTM you can select the connection type for the Modbus communication.

The following table contains a list of connection types available for selection:

Connection Type	Description
Serial Line	This connection type shall be selected for the following connections:· ● RS232 ● RS485 ● USB to RS232 converters ● USB to RS485 converters
Remote Gateway	For Modbus communications with serial devices which are located behind a Modbus TCP/Modbus SL gateway select this connection type.
Modem	Select this connection type if a remote connection via a standard serial modem shall be used for communication.
Bluetooth	Select this connection type if the communication to the target device shall be established via Bluetooth.
USB	Select this connection type if you are making a direct USB connection.

Configuration Commands

The following table contains a description of the configuration commands available in the **Configuration** tab

Command	Description
Ok	All parameters will be saved and the Modbus SL Comm DTM window will be closed. The new parameter values will be applied at the next connection.
Cancel	All parameter modifications are canceled and the Modbus SL Comm DTM window will be closed. The original values will be applied at the next connection.
Default	Displays the default parameter values.
Apply	Saves the parameters but the Modbus SL Comm DTM window remains open. The new parameter values will be applied at the next connection.

Serial Configuration for Modbus SL Comm DTM

Introduction

This chapter describes the parameters of the Modbus SL Comm DTM for RS232/RS485 connections

Serial Parameters

The following table contains a description of the communication parameters for a serial line connection.

Parameter	Description	Default value
Auto-Adaptation	Enables/disables the auto-adaptation function, which can be used to detect the communication parameters for Modbus Serial Line automatically.	Disabled
COM Port	PC COM port	COM1
Baud Rate	serial line baud rate	19200
Parity	serial line parity	Even
Stop Bits	number of stop bits	1
Global Timeout	Modbus slave response timeout	3000 ms
Retry Number	Number of times the Modbus Comm DTM will resend the Modbus request on the serial connection if a communication timeout occurred	0
Mode	Transmission mode: • RTU (8 bits) • ASCII (7 bits)	RTU

Bluetooth Configuration for Modbus SL Comm DTM

Introduction

This chapter describes the configuration of the Modbus SL Comm DTM for a Bluetooth connection

Bluetooth Configuration

The following table contains a description of the parameters for Bluetooth connections.

Parameter	Description
Bluetooth	This combo box contains a list of found virtual COM Ports provided by the Bluetooth adapters installed on your PC. Select the COM Port on which the Modbus communication shall be established. **NOTE:** If the desired COM Port is not available for selection try to establish the communication with the following configuration: ● set the **Connection Type** to serial line ● select the desired COM Port in the combo box
Global Timeout	Modbus slave response timeout
Retry Number	Number of times the Modbus SL Comm DTM will resend the Modbus request on the Bluetooth connection if a communication timeout occurred.

Remote Gateway Configuration for Modbus SL Comm DTM

Introduction

This chapter describes the configuration of the Modbus SL Comm DTM for the remote gateway connection.

Remote Gateway Configuration

The following table contains a description of the parameters for remote gateway connections.

Parameter	Description
Remote Gateway	IP Address of the Modbus SL Comm DTM gateway behind which the target devices are located
Global Timeout	Modbus slave response timeout
Retry Number	Number of times the Modbus SL Comm DTM will resend the Modbus request if a communication timeout occurred

Modem Connection Configuration for Modbus SL Comm DTM

Introduction

This chapter describes the configuration of the Modbus SL Comm DTM for the use with a standard serial modem to establish a remote connection.

Modem Connection Configuration

The following table contains a description of the parameters for a remote connection established via a standard serial modem.

Parameter	Description
Modem	List of modems installed on the PC. Select the modem which shall be used to establish the remote connection.
Global Timeout	Modbus slave response timeout
Retry Number	Number of times the Modbus SL Comm DTM will resend the Modbus request if a communication timeout occurred.
Phone Number	Enter the phone number of the remote network.

USB Connection Configuration for Modbus SL Comm DTM

Introduction

This chapter describes the configuration of the Modbus SL Comm DTM for a direct USB connection.

USB Connection Configuration

The following table contains a description of the parameters for an USB connection.

Parameter	Description
Global Timeout	Modbus slave response timeout
Retry Number	Number of times the Modbus SL Comm DTM will resend the Modbus request if a communication timeout occurred.

Runtime Tab

Introduction

The Modbus SL Comm DTM provides different types of runtime information. This chapter describes the information provided by the Modbus SL Comm DTM and the configuration of the log function.

Runtime Tab

The Modbus SL Comm DTM provides different types of runtime information, which can be used to monitor the established communications.

The runtime information is available on the **Runtime** tab of the Modbus SL Comm DTM, which can be accessed in the following manner:

- In the network view of your FDT Frame Application, double-click the Modbus SL Comm DTM icon. Now select the **Runtime** tab.
- In the network view of your FDT Frame Application, right-click the Modbus SL Comm DTM icon and then click **Configuration**. Now select the **Runtime** tab.

The following figure shows the **Runtime** tab of the Modbus SL Comm DTM dialog:

Configuration Commands

The following table contains a description of the configuration commands available in the **Runtime** tab.

Command	Description
OK	All parameters will be saved and the Modbus SL Comm DTM window will be closed. The new parameter values will be applied at the next connection.
Cancel	All parameter modifications are canceled and the Modbus SL Comm DTM window will be closed. The original values will be applied at the next connection.
Browse	opens a file browser to specify the log file path
Reset	resets all runtime parameters to zero
Apply	Saves the parameters but the Modbus SL Comm DTM window remains open. The new parameter values will be applied at the next connection.

Runtime Parameters

The following table contains a description of the runtime parameters available on the **Runtime** tab of the Modbus SL Comm DTM :

Command	Description
Connections	Number of active connections to the Modbus SL Comm DTM.
Sent Messages	Number of messages sent by the Modbus SL Comm DTM.
Received Messages	Number of messages received by the Modbus SL Comm DTM.
Exceptions	Number of Modbus Exception messages received by the Modbus SL Comm DTM.
Timeout Errors	Number of detected timeout errors on reception.

Log File

The Modbus SL Comm DTM provides the possibility to create a log file. In the **Log File** box you must specify the path in which the log file shall be stored.

The following table describes the information which will be written to the log file depending on the selected **Log Mode**:

Log Mode	Description
Deactivated	Disables the log file feature.
Error-Logging	Only information about detected timeout errors and received Modbus exceptions will be written to the log file.
All-Logging	In addition to the information about detected timeout errors and received Modbus exceptions, information about the sent Modbus requests and received Modbus responses, and the requests received from the Device DTM, is written to the log file.

Address Table

Introduction

The Modbus Comm DTM provides an address table which lists all connected Device DTMs and their target addresses. This chapter describes the information provided in the address table and the configuration of the target addresses of the devices.

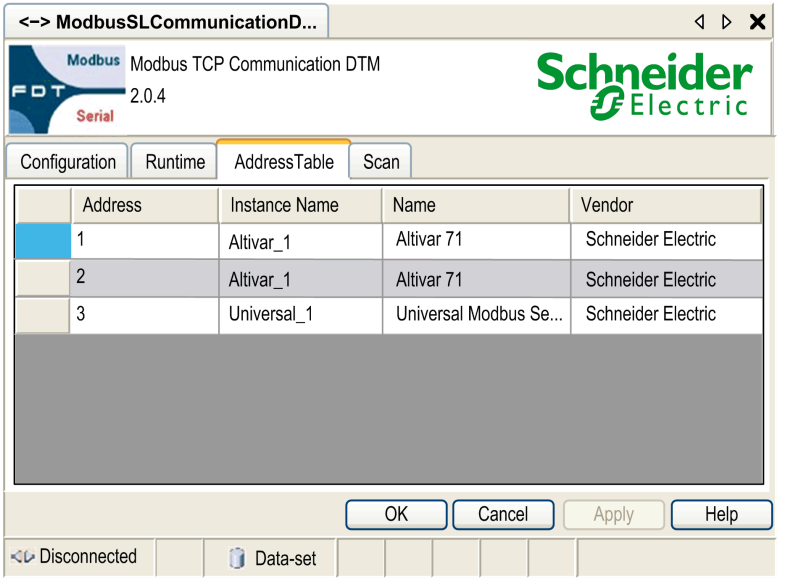
Address Table

The Modbus SL Comm DTM provides an address table which lists all connected Device DTMs and their target addresses. In this address table you can specify the target addresses of the connected Device DTMs.

The **Address Table** tab can be accessed in the following manner:

- In the network view of your FDT Frame Application, double-click the Modbus SL Comm DTM icon. Now select the **Address Table** tab.
- In the Network View of your FDT Frame Application, right-click the Modbus SL Comm DTM icon and then click **Configuration**. Now select the **Address Table** tab.

The following figure shows the **Address Table** tab of the Modbus SL Comm DTM dialog:



Configuration Commands

The following table contains a description of the configuration commands available in the **Address Table** tab

Command	Description
OK	All modifications will be saved and the Modbus SL Comm DTM window will be closed. The new values will be applied at the next connection.
Cancel	All modifications are canceled and the Modbus SL Comm DTM window will be closed. The original values will be applied at the next connection.
Apply	Saves the modifications but the Modbus SL Comm DTM window remains open. The new values will be applied at the next connection.

Address Information

The following table contains a description of the address information available on the **Address Table** tab of the Modbus SL Comm DTM:

Parameter	Description
Address	Target address of the hardware device, which shall be configured with the connected DTM
Instance Name	Instance name of the DTM
Name	DTM specific name
Vendor	DTM vendor name

Address Assignment

The address table of the Modbus SL Comm DTM can be used to specify the target address of the hardware device, which shall be configured with a specific DTM. To specify the target address you have to enter the new address in the corresponding **Address** field of this DTM and to validate this modification by clicking either the **Apply** button or by clicking the **Ok** button.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION FOR MODBUS SL

Do not communicate to a device with an address of 248 on a bus with multiple Modbus devices connected.

Only establish connections to a device using an address of 248 point-to-point; that is, directly between the PC and the device.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Scan Configuration

Introduction

The Modbus Comm DTM provides the possibility to specify the range of the scanned addresses for the FDT scan. This chapter describes the configuration of the scan parameters for the FDT scan.

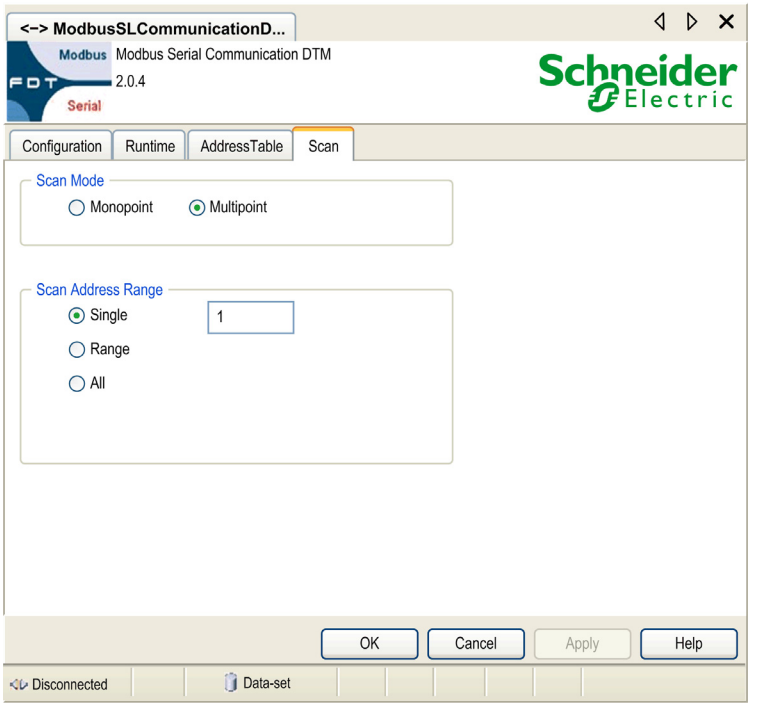
Scan Tab

The Modbus SL Comm DTM supports the scan function as it is defined the FDT specification V1.2.1. The scan can be used to build automatically the network topology of the underlying communication network. The Modbus SL Comm DTM provides the possibility to specify the range of the scanned addresses.

The scan parameters are available on the **Scan** tab of the Modbus SL Comm DTM, which can be accessed in the following manner:

- In the Network View of your FDT Frame Application, double-click the Modbus SL Comm DTM icon. Now select the **Scan** tab.
- In the Network View of your FDT Frame Application, right-click the Modbus SL Comm DTM icon and then click **Configuration**. Now select the **Scan** tab.

The following figure shows the **Scan** tab of the Modbus SL Comm DTM dialog:



Configuration Commands

The following table contains a description of the configuration commands available in the **Scan** tab:

Command	Description
OK	All modifications will be saved and the Modbus Comm DTM window will be closed. The new values will be applied at the next scan.
Cancel	All modifications are canceled and the Modbus Comm DTM window will be closed. The original values will be applied at the next scan.
Apply	Saves the modifications but the Modbus Comm DTM window remains open. The new values will be applied at the next scan.

Scan Parameters for Modbus SL

The following table contains a description of the scan parameters available on the **Scan** tab of the Modbus SL Comm DTM:

Command	Description	
Scan Mode	Scan Mode:	
	Monopoint	Select this connection type only for direct connections, where the target device is directly connected to the PC (scanned Address Range: 248).
	Multipoint	Select this connection type only for multipoint connections, where the PC is connected to a Modbus Serial Line network.
Scan Address Range	Scan Address Range:	
	Single	Scans only a single address of one target device in the range between 1-247.
	Range	Scans a specified address range between 1-247.
	All	Scans the complete address range of the Modbus Serial connection (all addresses between 1-247.

⚠ WARNING

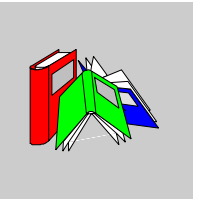
UNINTENDED EQUIPMENT OPERATION

Do not use the scan mode “Monopoint” on a Modbus multipoint network.

Only use the scan mode “Monopoint” with point-to-point communication; that is, directly between the PC and the device.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Glossary



C

configuration

The arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

CRC

cyclic redundancy check.

Messages that implement this error checking mechanism have a CRC field that is calculated by the transmitter according to the message's content. Receiving nodes recalculate the field. Disagreement in the two codes indicates a difference between the transmitted message and the one received.

D

DTM

A DTM (Device Type Manager) is a kind of device driver, which is provided by the field device vendor. The DTM contains the device specific information and provides a graphical user interface. The DTM can be used to perform monitoring tasks and configuration tasks on the specific device. A DTM is not a standalone application, it requires an FDT Frame Application to run.

E

Ethernet

A LAN cabling and signaling specification used to connect devices within a defined area, e.g., a building. Ethernet uses a bus or a star topology to connect different nodes on a network.

F

FDT

The FDT (Field Device Tool) technology standardizes the communication interface between field devices and systems (*www.fdtgroup.org*).

function code

A function code is an instruction set commanding 1 or more slave devices at a specified address(es) to perform a type of action, e.g., read a set of data registers and respond with the content.

G

gateway

A program or hardware that passes data between networks

I

IP

internet protocol.

That part of the TCP/IP protocol family that tracks the internet addresses of nodes, routes outgoing messages, and recognizes incoming messages.

L

LAN

local area network.

A short-distance data communications network.

M

master/slave model

The direction of control in a network that implements the master/slave model is from the master to the slave devices.

MB

abbreviation for Modbus

Modbus

Modbus is an application layer messaging protocol. Modbus offers many services specified by function codes.

S

SL

abbreviation for Serial Line

T

TCP

transmission control protocol.

A connection-oriented transport layer protocol that provides reliable full-duplex data transmission. TCP is part of the TCP/IP suite of protocols.

telegram

A data packet used in serial communication.

Index

A

address table, *37*
auto-adaptation, *30*

B

bluetooth
  connection, *17*
bluetooth configuration, *31*

C

communication models, *17*
compatibility, *12*
configuration tab, *28*
connection
  bluetooth, *16*, *17*
  bus, *17*
  direct, *17*
  direct, RS232, *17*
  direct, RS485, *17*
  direct, USB, BMX XCA USB H018/045, *17*
  direct, USB, TCS XCN AMUM3P, *17*
  direct, USB, UNY XCA USB 033, *17*
  direct, USB/serial line, *17*
  gateway, *16*, *17*
  serial, *16*
  serial modem, *16*, *17*
  types, *16*
  USB, *16*
  USB/RS232 converter connection, *16*
  USB/RS485 converter connection, *16*
considerations, *13*

D

DTM graphical user interface, *23*

G

graphical user interface, *23*

I

installation, *14*

M

modem connection configuration, *33*

R

remote gateway configuration, *32*
requirements
    hardware, *10*
    software, *10*
retry number, *30*, *31*, *32*, *33*, *34*
RS232, *28*
RS485, *28*
runtime tab, *35*

S

scan configuration, *39*
scan mode, *39*
serial configuration, *30*

U

USB connection configuration, *34*
user interface, *23*